

What is claimed is:

1. A headlamp, comprising:
 - a housing defining an inner surface and an outer surface;
 - an outer light transmissive member adapted to engage with said housing, defining a three-dimensional space therebetween;
 - a plurality of reflector units positioned within said space;
 - a corresponding plurality of high-flux light emitting diodes arranged at the base of said reflector units and operatively mounted to a support member such that emitted light rays are directed away from said support member;
 - a plurality of inner light transmissive members adjacent to said outer light transmissive member, wherein each of said plurality of inner light transmissive members is fixedly secured to at least one alignment mechanism such that each of said plurality of inner light transmissive members corresponds to one of said plurality of light emitting diodes;
 - and a heat dissipating mechanism;

wherein said headlamp effectively emanates white light in any given direction.
2. A headlamp according to claim 1 wherein said outer light transmissive member defines a lens cover, with an inner and outer face, for said housing.
3. A headlamp according to claim 2 wherein said plurality of reflector units collimate a first portion of said emitted light rays, forming first incident light rays

substantially parallel to a longitudinal axis of said headlamp and directed toward said lens cover.

4. A headlamp according to claim 3 wherein said plurality of inner light transmissive members collimate a second portion of said emitted light rays, forming second incident light rays substantially parallel to said longitudinal axis and directed toward said lens cover.
5. A headlamp according to claim 2 wherein said plurality of light emitting diodes are arranged in a plurality of rows on said support member to form an array of light emitting diodes.
6. A headlamp according to claim 5 wherein said plurality of reflector units are operatively arranged in a plurality of rows to form a reflector array that corresponds to said array of light emitting diodes.
7. A headlamp according to claim 6 wherein each of said plurality of reflector units comprises a parabolic reflector with a six (6) millimeter focal length.
8. A headlamp according to claim 6 wherein said plurality of reflector units form a unitary reflector subassembly.

9. A headlamp according to claim 8 wherein said reflector subassembly is constructed of a metalized thermoplastic material.
10. A headlamp according to claim 5 wherein said array of light emitting diodes comprises six light emitting diodes operatively arranged in two rows of three light emitting diodes, and wherein said plurality of reflector units comprises six reflector units operatively arranged in a reflector array that corresponds to said array of light emitting diodes.
11. A headlamp according to claim 10 wherein each of said plurality of reflector units comprises a parabolic reflector with a six (6) millimeter focal length.
12. A headlamp according to claim 10 wherein said plurality of reflector units form a unitary reflector subassembly.
13. A headlamp according to claim 12 wherein said reflector subassembly is constructed of a metalized thermoplastic material.
14. A headlamp according to claim 5 wherein said array of light emitting diodes comprises fourteen light emitting diodes and wherein said plurality of reflector units comprises fourteen reflector units operatively arranged in a reflector array that corresponds to said array of light emitting diodes.

15. A headlamp according to claim 14 wherein each of said plurality of reflector units comprises a parabolic reflector with a six (6) millimeter focal length.
16. A headlamp according to claim 14 wherein said plurality of reflector units form a unitary reflector subassembly.
17. A headlamp according to claim 16 wherein said reflector subassembly is constructed of a metalized thermoplastic material.
18. A headlamp according to claim 4 wherein each of said plurality of inner light transmissive members are aligned generally parallel to said outer light transmissive member and in front of one of said plurality of light emitting diodes.
19. A headlamp according to claim 18 wherein each of said plurality of inner light transmissive members is an aspheric lens.
20. A headlamp according to claim 4 wherein said at least one alignment mechanism comprises a plurality of annular extensions corresponding to said plurality of inner light transmissive members, each of said annular extensions integral to said inner face of said outer light transmissive member and extending laterally therefrom.

21. A headlamp according to claim 20 wherein each of said plurality of inner light transmissive members is an aspheric lens.
22. A headlamp according to claim 4 wherein said outer light transmissive member comprises at least one optical surface formed on said inner face of said outer light transmissive member.
23. A headlamp according to claim 22 wherein said at least one optical surface comprises:
 - a first optical surface for producing a wide light pattern extending approximately thirty (30) degrees left to approximately thirty (30) right of a vertical axis of said headlamp;
 - a second optical surface for producing a narrow light pattern extending approximately eight (8) degrees left to approximately eight (8) degrees right of said vertical axis and approximately zero (0) degrees to approximately four (4) degrees up from a longitudinal axis of said headlamp;
 - and a third optical surface for producing a concentrated point of light located approximately two (2) degrees down from said longitudinal axis and approximately two (2) degrees right of said vertical axis.
24. A headlamp according to claim 23 wherein said at least one optical surface comprises a rectangular array of prism optics.

25. A headlamp according to claim 23 wherein said first optical surface comprises prism optics generally convex toward said plurality of light emitting diodes.
26. A headlamp according to claim 23 wherein said second optical surface comprises prism optics generally convex toward said plurality of light emitting diodes.
27. A headlamp according to claim 23 wherein said third optical surface comprises prism optics generally concave toward said plurality of light emitting diodes.
28. A headlamp according to claim 22 wherein said at least one optical surface comprises:
 - a first optical surface for producing a first light pattern extending approximately six (6) degrees left and right of a longitudinal axis of said headlamp;
 - a second optical surface for producing a second light pattern extending approximately three (3) degrees left to approximately three (3) right of a vertical axis of said headlamp;
 - a third optical surface for producing a third light pattern extending approximately nine (9) degrees left to approximately nine (9) right of said vertical axis;
 - and a fourth optical surface for producing a fourth light pattern extending approximately fifteen (15) degrees left to approximately fifteen (1) degrees

right of said vertical axis of said headlamp and approximately one (1) degree downward from said longitudinal axis.

29. A headlamp according to claim 28 wherein said at least one optical surface comprises a plurality of adjacent, linear prisms formed on said inner face of said outer light transmissive member.
30. A headlamp according to claim 29 wherein each of said linear prisms has a conic cross section and is generally convex toward said plurality of light emitting diodes to function as a convergent optic.
31. A headlamp according to claim 1 further comprising a driver circuit with a current regulation mechanism, said driver circuit operatively arranged to drive said plurality of light emitting diodes.
32. A headlamp according to claim 1 wherein each of said plurality of light emitting diodes has a minimum luminous flux of approximately 50 lumens.
33. A headlamp according to claim 1 wherein each of said plurality of light emitting diodes has an average luminous flux of approximately 70 lumens.
34. A headlamp according to claim 1 wherein said housing functions as said heat dissipating mechanism.

35. A headlamp according to claim 34 wherein said housing is constructed of aluminum.
36. A headlamp according to claim 34 wherein said housing is constructed of zinc.
37. A headlamp according to claim 1 wherein said support member is generally planar.
38. A headlamp according to claim 37 wherein said support member is an aluminum core circuit board operatively mounted on housing.
39. A headlamp according to claim 1 wherein said outer light transmissive member is hermetically sealed to said housing.
40. A headlamp according to claim 1 wherein said outer light transmissive member and said housing are generally rectangular.
41. A headlamp according to claim 40 wherein said headlamp is a four (4) inch by six (6) inch sealed-beam headlamp for a quad headlamp assembly.
42. A headlamp according to claim 1 wherein said outer light transmissive member and said housing are generally circular.

43. A headlamp according to claim 42 wherein said headlamp is a seven (7) inch round combined low beam/high beam, sealed-beam headlamp for a dual headlamp assembly.
44. A headlamp according to claim 1 wherein said headlamp functions as one of two low beam headlamps in a quad headlamp assembly that satisfies the minimum and maximum photometric requirements of the Society of Automotive Engineers Standards J1383 for low beam headlamps.
45. A headlamp according to claim 1 wherein said headlamp functions as one of two high beam headlamps in a quad headlamp assembly that satisfies the minimum and maximum photometric requirements of the Society of Automotive Engineers Standards J1383 for high beam headlamps.
46. A headlamp according to claim 1 wherein said headlamp functions as one of two combined low beam/high beam headlamps in a dual headlamp assembly that satisfies the minimum and maximum photometric requirements of the Society of Automotive Engineers Standards J1383 for low beam and high beam headlamps.
47. A headlamp, comprising:
a housing formed of a material for transferring heat away from said plurality of light emitting diodes;

an outer light transmissive member with an inner and outer face, said outer light transmissive member adapted to engage with said housing to define a three-dimensional space therebetween;

a unitary reflector subassembly positioned within said space, wherein said reflector subassembly comprises an array of parabolic reflector units;

a corresponding array of high-flux light emitting diodes as a light source;

at least one inner light transmissive member adjacent to said outer light transmissive member;

at least one alignment mechanism, wherein said at least one inner light transmissive member is fixedly secured to said at least one alignment mechanism such that said at least one inner light transmissive member is aligned generally parallel to said outer light transmissive member and in front of said array of light emitting diodes;

and a driver circuit with a current regulation mechanism.

48. A headlamp according to claim 47 wherein said outer light transmissive member defines a lens cover for said housing.
49. A headlamp according to claim 47 wherein said housing is constructed of aluminum.
50. A headlamp according to claim 47 wherein said housing is constructed of zinc.

51. A headlamp according to claim 47 wherein said at least one inner light transmissive member is an aspheric lens.
52. A headlamp according to claim 47 wherein said array of light emitting diodes comprises six light emitting diodes operatively arranged in two rows of three light emitting diodes, and wherein said reflector subassembly comprises six parabolic reflector units operatively arranged to correspond to said array of light emitting diodes.
53. A headlamp according to claim 47 wherein said reflector subassembly is constructed of a metalized thermoplastic material.
54. A headlamp according to claim 47 wherein said outer light transmissive member comprises at least one optical surface to produce a wide light pattern extending approximately thirty (30) degrees left to approximately thirty (30) right of a vertical axis of said headlamp; a narrow light pattern extending approximately eight (8) degrees left to approximately eight (8) degrees right of said vertical axis and approximately zero (0) degrees to approximately four (4) degrees up from a longitudinal axis of said headlamp; and a concentrated point of light located approximately two (2) degrees down from said longitudinal axis and approximately two (2) degrees right of said vertical axis.

55. A headlamp according to claim 54 wherein said at least one optical surface comprises a rectangular array of prism optics formed on said inner face of said outer light transmissive member.
56. A headlamp according to claim 47 wherein said outer light transmissive member comprises at least one optical surface to produce a first light pattern extending approximately six (6) degrees left and right of a longitudinal axis of said headlamp; a second light pattern extending approximately three (3) degrees left to approximately three (3) right of a vertical axis of said headlamp; a third light pattern extending approximately nine (9) degrees left to approximately nine (9) right of said vertical axis; and a fourth light pattern extending approximately fifteen (15) degrees left to approximately fifteen (1) degrees right of said vertical axis of said headlamp and approximately one (1) degree downward from said longitudinal axis.
57. A headlamp according to claim 56 wherein said at least one optical surface comprises a plurality of adjacent linear prisms formed on said inner face of said outer light transmissive member.
58. A headlamp according to claim 57 wherein each of said plurality of linear prisms has a conic cross section and is generally convex toward said plurality of light emitting diodes to function as a convergent optic.

59. A headlamp according to claim 47 wherein each light emitting diode in said array of light emitting diodes has a minimum luminous flux of approximately 50 lumens.
60. A headlamp according to claim 47 wherein each light emitting diode in said array of light emitting diodes has an average luminous flux of approximately 70 lumens.
61. A headlamp according to claim 47 wherein said outer light transmissive member is hermetically sealed to said housing.
62. A headlamp according to claim 47 wherein said outer light transmissive member and said housing are generally rectangular.
63. A headlamp according to claim 62 wherein said headlamp is a four (4) inch by six (6) inch sealed-beam headlamp for a quad headlamp system.
64. A headlamp according to claim 47 wherein said outer light transmissive member and said housing are generally circular.
65. A headlamp according to claim 64 wherein said headlamp is a seven (7) inch round combined low beam/high beam, sealed-beam headlamp for a dual headlamp assembly.

66. A headlamp according to claim 47 wherein said headlamp functions as one of two low beam headlamps in a quad headlamp assembly that satisfies the minimum and maximum photometric requirements of the Society of Automotive Engineers Standards J1383 for low beam headlamps.
67. A headlamp according to claim 47 wherein said headlamp functions as one of two high beam headlamps in a quad headlamp assembly that satisfies the minimum and maximum photometric requirements of the Society of Automotive Engineers Standards J1383 for high beam headlamps.
68. A headlamp according to claim 47 wherein said headlamp functions as one of two combined low beam/high beam headlamps in a dual headlamp assembly that satisfies the minimum and maximum photometric requirements of the Society of Automotive Engineers Standards J1383 for low beam and high beam headlamps.
69. A headlamp, comprising:
 - a housing defining an inner surface and an outer surface;
 - an outer light transmissive member adapted to engage with said housing, defining a three-dimensional space therebetween;
 - a plurality of reflector units positioned within said space;
 - a corresponding plurality of high-flux light emitting diodes arranged at the base of said reflector units and operatively mounted to a support member;

a plurality of inner light transmissive members adjacent to said outer light transmissive member;

a plurality of annular extensions integral to said outer light transmissive member, wherein said plurality of inner light transmissive members are fixedly secured to said plurality of annular extensions;

a heat dissipating mechanism for transferring heat away from said plurality of light emitting diodes;

and a driver circuit with a current regulation mechanism;

wherein said headlamp effectively emanates white light in any given direction.

70. A headlamp, comprising:

a housing;

an outer light transmissive member adapted to engage with said housing to define a three-dimensional space therebetween;

a plurality of reflector units positioned within said space;

a corresponding plurality of high-flux light emitting diodes as a light source arranged at the base of said reflector units;

a plurality of inner light transmissive members adjacent to said outer light transmissive member;

and a rectangular array of prism optics formed on said outer light transmissive member such that said headlamp produces white light in a distribution pattern comprising:

a wide light pattern extending approximately thirty (30) degrees left to approximately thirty (30) right of a vertical axis of said headlamp;
a narrow light pattern extending approximately eight (8) degrees left to approximately eight (8) degrees right of said vertical axis and approximately zero (0) degrees to approximately four (4) degrees up from a longitudinal axis of said headlamp;
and a concentrated point of light located approximately two (2) degrees down from said longitudinal axis and approximately two (2) degrees right of said vertical axis.

71. A headlamp, comprising:

a housing;
an outer light transmissive member adapted to engage with said housing to define a three-dimensional space therebetween;
a plurality of reflector units positioned within said space;
a corresponding plurality of high-flux light emitting diodes as a light source arranged at the base of said reflector units;
a plurality of inner light transmissive members adjacent to said outer light transmissive member;
and a plurality of adjacent linear optics formed on said outer light transmissive member such that said headlamp produces white light in a distribution pattern comprising:

a first light pattern extending approximately six (6) degrees left and right of a longitudinal axis of said headlamp;

a second light pattern extending approximately three (3) degrees left to approximately three (3) right of a vertical axis of said headlamp;

a third light pattern extending approximately nine (9) degrees left to approximately nine (9) right of said vertical axis;

and a fourth light pattern extending approximately fifteen (15) degrees left to approximately fifteen (1) degrees right of said vertical axis of said headlamp and approximately one (1) degree downward from said longitudinal axis.

72. A headlamp assembly comprising:

at least two headlamps comprising a plurality of high-flux light emitting diodes as a light source;

each of said at least two headlamps comprising:

a housing;

an outer light transmissive member hermetically sealed with said housing, thereby defining a three-dimensional space;

a plurality of reflector units positioned within said space and operatively arranged to correspond to said plurality of light emitting diodes;

at least one inner light transmissive member adjacent to said outer light transmissive member;

a heat dissipating mechanism;

and a driver circuit with a current regulation mechanism, said driver circuit operatively arranged to drive said plurality of light emitting diodes.

73. A headlamp assembly according to claim 72 comprising two (2) low beam headlamps and two (2) high beam headlamps.
74. A headlamp assembly according to claim 73 wherein each of said low beam headlamps comprises at least one optical surface formed on said outer light transmissive member to produce white light in a distribution pattern comprising:
 - a wide light pattern extending approximately thirty (30) degrees left to approximately thirty (30) right of a vertical axis of said headlamp,
 - a narrow light pattern extending approximately eight (8) degrees left to approximately eight (8) degrees right of said vertical axis and approximately zero (0) degrees to approximately four (4) degrees up from said longitudinal axis;
 - and a concentrated point of light located approximately two (2) degrees down from said longitudinal axis and approximately two (2) degrees right of said vertical axis.
75. A headlamp assembly according to claim 74 wherein said at least one optical surface comprises a rectangular array of prism optics formed on said inner face of said outer light transmissive member.

76. A headlamp assembly according to claim 73 wherein each of said high beam headlamps comprises at least one optical surface formed on said outer light transmissive member to produce white light in a distribution pattern comprising:
 - a first light pattern extending approximately six (6) degrees left and right of the longitudinal axis;
 - a second light pattern extending approximately three (3) degrees left to approximately three (3) right of said vertical axis;
 - a third light pattern extending approximately nine (9) degrees left to approximately nine (9) right of said vertical axis,;
 - and a fourth light pattern extending approximately fifteen (15) degrees left to approximately fifteen (1) degrees right of said vertical axis of said headlamp and approximately one (1) degree downward from said longitudinal axis.
77. A headlamp assembly according to claim 76 wherein said at least one optical surface comprises a plurality of adjacent linear prisms formed on said inner face of said outer light transmissive member.
78. A headlamp assembly according to claim 77 wherein each of said linear prisms has a conic cross section and is generally convex toward said plurality of light emitting diodes to function as a convergent optic.

79. A headlamp assembly according to claim 72 comprising two (2) combined low beam/high beam headlamps.
80. A headlamp assembly according to claim 72 that satisfies the minimum and maximum photometric requirements of the Society of Automotive Engineers Standards J1383 for headlamps.